8-24-2019

The History of Mathematics: A Source-Based Approach, Volume 1 (Book Review)

Calvin Jongsma
Dordt University, calvin.jongsma@dordt.edu

The History of Mathematics: A Source-Based Approach, Volume 1 (Book Review)

Abstract
Reviewed Title: *The History of Mathematics: A Source-based Approach, Volume 1* by June Barrow-Green, Jeremy Gray, and Robin Wilson. Providence : American Mathematical Society, 2019. 488 pp. ISBN: 9781470443528.

Keywords
book review, The History of Mathematics, June Barrow-Green, Jeremy Gray, Robin Wilson

Disciplines
Mathematics

Comments
Online access: https://www.maa.org/press/maa-reviews/the-history-of-mathematics-a-source-based-approach-volume-1

MAA
MATHEMATICAL ASSOCIATION OF AMERICA

The History of Mathematics: A Source-based Approach, Volume 1

June Barrow-Green, Jeremy Gray, and Robin Wilson

Publisher: American Mathematical Society
Publication Date: 2019
Number of Pages: 488
Format: Hardcover
Series: AMS/MAA Textbooks (Book 45)
Price: $89.00
ISBN: 978-1-4704-4352-8
Category: Textbook

MAA REVIEW | TABLE OF CONTENTS

[Reviewed by Calvin Jongsma, on 08/24/2019]

The History of Mathematics: A Source-Based Approach, Volume 1 is a substantial, well-written textbook that derives from correspondence materials developed for the Open University's year-long undergraduate history of mathematics course, which was regularly offered to distance learners from 1987 to 2007. This volume focuses on the first half of that course:

- The mathematics of Egypt and Mesopotamia (Chapter 2),
- Classical Greek and Hellenistic mathematics (Chapters 3–6),
- The mathematics of India and China (Chapter 7),
- Islamic mathematics (Chapter 8),
- Medieval European mathematics (Chapter 9),
- Renaissance mathematics in Europe and Great Britain (Chapters 10–11),
- The astronomical revolution of the mid-16th to early-17th century (Chapter 12), and
- early 17th-century European mathematics (Chapter 13).

Volume 2 will resume with the rise of the calculus and take the story at least through 19th-century European developments in a variety of fields if the 1987 Open University sourcebook *The History of Mathematics: A Reader* by John Fauvel and Jeremy Gray remains a trusty guide for the project.

The treatment of the history of mathematics in this text is extensive and authoritative, using up-to-date scholarship by the authors and other recognized experts in the field, and introduces the reader to a myriad of primary and secondary sources for each topic. While a great many of the Reader's excerpts are included verbatim, the source material from that work is now explained and contextualized within a narrative framework. Non-Western cultures that were omitted earlier (China and India) are now covered, and the role of astronomy and trigonometry in the development of mathematics is expanded to include the work of Ptolemy and Copernicus. The text also draws from source material and studies whose publication post-date that of the *Reader*, notably the 2007 sourcebook edited by Victor Katz, *The Mathematics of Egypt, Mesopotamia, China, India, and Islam* (though not its 2016 companion *Sourcebook in the Mathematics of Medieval Europe and North Africa*) and various specialized monographs.

Readers may be somewhat surprised (but mostly pleased) by the sheer quantity of source material included in this text. Not only does it contain the expected excerpts from key European mathematicians such as Euclid, Archimedes, Cardano, Descartes, and others; there are also lengthy passages from non-Western sources such as

the *Nine Chapters* and Khayyām, and sizable excerpts touching on attendant ideas and cognate developments that help the reader place mathematics within its cultural setting — readings on philosophy of mathematics (e.g., Plato, Aristotle, Descartes), on astronomical matters (Ptolemy, Kepler, Galileo), and on mathematical education (Recorde). Often these excerpts are concisely elucidated in the text itself or in an explanatory box; at other times readers are left on their own to supply the understanding. As the authors note in the introductory chapter, while all the topics they take up are part of mainstream mathematics, some of them are more demanding than others, in part because our modern approach differs appreciably from how they arose. So, since the text focuses on the history of mathematics, it occasionally summarizes an excerpt's general thrust and historical significance without going into the weeds on technical details.

Naturally, a sweeping survey requires a degree of selectivity, which means readers may still wish to supplement the text's treatment here or there with some of their personal favorites. For instance, the book discusses Eudoxus' theory of ratio and proportion (Euclid V) but not the theory it superseded (anthyphairesis) nor the Pythagorean numerical theory (Euclid VII). Or, to give a cross-cultural example, the text discusses algebraic developments in each culture (though at times hesitating to use the term algebra), which should allow the reader to compare differing approaches to solving quadratic problems (surprisingly, this is not one of their general essay questions), but the text contains no information regarding India's approach, nor does it explore the so-called *geometrical algebra* of Euclid, ignoring those excerpts in the Reader. (Aside: to locate the one place in the text where this latter term is mentioned, the Index, which contains only proper names, is of no help.) The text certainly contains enough material, however, for a semester-long course, should instructors wish to adopt it.

Which raises a marketing issue that may be the most serious challenge facing the text. Who is the intended audience for this book? By calling it a textbook, MAA Press is presumably offering it as a viable choice for an undergraduate history of mathematics course in an American college or university, not as the bequest of materials once used in Great Britain by Open University students. But such courses are designed, I suspect, mainly for mathematics education majors and would thus ordinarily include some material on the history of calculus and possibly also a few modern topics in algebra, analysis, and geometry, none of which appear in this volume. This concern will be alleviated by the publication of Volume 2, but requiring two good-sized books as a class text would be a stretch for most instructors.

If this were adopted as a text, what learning resources does it provide for instructors? Each chapter is written as a scholarly essay on the topic, but Chapter 15 supplies the reader with writing exercises along with detailed general advice to students on how to answer them. There are three types of exercises: four more routine exercises per chapter to explain a problem, a theorem, or some commentary (500–1000 word answers); two or three chapter-based essay questions per chapter (1000–1500 word answers); and 10 general essay questions for the book as a whole (1500–2000 word answers). Instructors who would also like to require their students to work some period problems in the style of an era or a text, as some history of mathematics texts do, will need to add these in themselves.

Notwithstanding questions about how this book might fare as a textbook, here are the things I greatly appreciate about it. First and foremost is its wide-ranging and voluminous inclusion of source material. It is important for students to engage directly with the mathematics itself, as originally written if they are to get a good feel for the mathematics of another time and place. I also like the masterful way the source material is contextualized and explained. And I welcome the inclusion of alternative interpretations of a development, where they exist, and the book encouraging readers as "joint explorers" to think through the evidence for each viewpoint (though I would have liked to have seen the authors give their own evaluation more often than they do). Whatever reservations one might have about using this book as a class text, I believe it will be a wonderful resource for anyone teaching the history of mathematics, and as such, it certainly belongs in every academic library.

Calvin Jongsma (Calvin.Jongsma@dordt.edu) is Professor of Mathematics Emeritus at Dordt University in Sioux Center, Iowa. His joint Ph.D. in Mathematics and History of Mathematics from the University of Toronto prepared him to teach a wide range of college mathematics courses, including an upper-level alternate-year history of mathematics course.